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ABSTRACT

This study compared the relationship between learning style preferences and learner success of students in an online graduate level instructional design course with an equivalent face-to-face course. Comparisons included motivation maintenance, task engagement, and cognitive controls. Results revealed significant relationships between preferences and course success on five constructs for the face-to-face students and no significant relationships for the online students. Overall, the findings suggest that students can be equally successful in face-to-face and online environments regardless of learning style preferences. (Contains 10 references.) (Author/MES)

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The Influence of Learning Style Preferences on Student Success in Online vs. Face-to-Face Environments

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Abstract: This study compared the relationship between learning style preferences and learner success of students in an online course with an equivalent face-to-face course. Comparisons included motivation maintenance, task engagement, and cognitive controls. Results revealed significant relationships between preferences and course success on five constructs for the face-to-face students and no significant relationships for the online students. Overall, the findings suggest that students can be equally successful in face-to-face and online environments regardless of learning style preferences.

Introduction

New advances in Internet-based technology have brought challenges and opportunities to education and training, in particular through online instruction. While online instruction is gaining popularity, it is not free from criticism. Many educators and trainers are not advocates of online instruction because they do not believe it actually solves difficult teaching and learning problems (Conlon, 1997) while others are concerned about the many barriers that hinder effective online teaching and learning. These concerns include the changing nature of technology, the complexity of networked systems, the lack of stability in online learning environments, and the limited understanding of how much students and instructors need to know to successfully participate (Brandt, 1996). Online instruction also threatens to commercialize education, isolate students and faculty, and may reduce standards or even devalue university degrees (Gallick, 1998). Although the growth of online programs has been significant in recent years, the capabilities and efficacy of such programs have yet to be fully investigated. While researchers are viewing online instruction as a viable option for all types of learners (Hill, 1997), the issue of using learning styles research to create more positive, effective learning environments for all students is virtually unexplored.

Purpose

The primary purpose of this exploratory empirical study was to compare the relationship of learning style preferences and learning success for students enrolled in an online versus a traditional face-to-face course format. Comparisons included the environmental factors that maintain student motivation in the classroom, task engagement strategies, and cognitive processing habits (cognitive controls).

Research Questions

This study was designed to answer the following research questions.

1. Are there distinguishable differences in the learning style preferences of students enrolled in an online versus a face-to-face learning environment?
2. How do learning style preferences relate to the student outcomes achieved in online and face-to-face learning environments?

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3. What learning style constructs significantly influence student outcomes in both the online and face-to-face delivery formats?

Theoretical Framework

Curry's (1991) Model of Learning Style Components and Effects served as the theoretical framework for the study which posits that motivation maintenance, task engagement and cognitive controls must be considered together. Motivational levels are maintained once the learner establishes preferred environmental and social conditions for learning. Task engagement level is reflected in the amount of attention that is paid to features in the instructional situation, how persistent the learner will be, the degree of participation, the enthusiasm, and degree of concentration the learner sustains throughout and beyond the instructional situation. Cognitive controls refer to the information processing habits or control systems that learners bring to learning situations.

Method

Instructional Context: Data were collected from two sections of a graduate level instructional design course for human resource development professionals. One version of the course was taught on the campus of a large Midwestern university through traditional a face-to-face format while the other version of the same course was offered totally online, with no direct face-to-face contact between the instructor and the students. Both courses were taught by the same instructor, delivered by the same department, and required the same content, activities, and projects. The instructional treatment of each topic followed the same organization.

Subjects: This exploratory empirical study compared outcome data obtained from students enrolled in one of two versions of a graduate level instructional design course for human resource development professionals. Nineteen students, most of whom are pursuing a graduate degree in HRD, were enrolled in the on-campus course. These students can be viewed as traditional university students who are actively pursuing an advanced degree through full time study on campus. Nineteen students were also enrolled in the online version of the course. These students are also pursuing a graduate degree in HRD through a degree program that is taught completely online. The online group can be viewed as nontraditional students because they are able to complete their advanced degree without ever setting foot on campus. The slight differences between the two groups in age, the year they received their baccalaureate degree, undergraduate GPA, years of work experience, and knowledge of instructional design were non-significant.

Instrumentation: The Grasha and Reichmann *Student Learning Style Scale* (Riechmann & Grasha, 1974) was used to assess motivation maintenance. The SLSS consists of 90 self-report items. A 5-point Likert-type scale describes the learner along the bipolar scale dimensions of independent vs. dependent, avoidant vs. participant, and collaborative vs. competitive. Task engagement was assessed by the Weinstein, Palmer, and Schulte (1987) *Learning and Study Strategies Inventory*. The LASSI contains 83 items. Subjects are asked to respond to the items on a five-point Likert scale. The items are sorted to ten variables including anxiety, attitude, concentration, information processing, motivation, scheduling, selecting the main idea, self-testing, study aides, and test strategies. Finally, cognitive control functions were assessed through the Kolb (1985) *Learning Style Inventory*. The LSI was developed around Kolb's experiential learning model. The LSI contains 12 sentence stems, each having four sub-items to be rank ordered. Responses are organized into two bipolar concepts: concrete experience vs. reflective observation, and abstract conceptualization vs. active experiementation.

Procedures: All date were collected near the end of the semester as part of a discussion and activity on learning styles. All students completed paper versions of all three instruments. The online students received and returned the instruments through the mail. The face-to-face students completed and returned their instruments during a class session. All instrument data were entered into a statistical analysis package for later analysis. Statistical analyses were conducted using independent t-tests and bivariate correlation analysis. All statistical tests reported in this paper were conducted with a significance level of .05. The search for distinguishable relationships in student outcomes (i.e., content knowledge and quality of course assignments and projects) across learning style preferences was conducted using a combination of performance indicators on class assignments collected during the course.

Results

Learning Style Differences: As shown in Table 1, the results of the independent t-tests indicate no significant differences in the social and environmental preferences between the students of the two delivery formats. Table 1 also reveals that both the face-to-face and online students are also comparable in their learning and study strategies with the exception of "study aids." This particular subscale assesses how effective students are at using support techniques and materials above and beyond those required by the course. This result indicates that the face-to-face students reports greater use of such techniques and materials ($M = 30.17$, $SD = 4.76$), $t(34) = 4.10$, $p < .05$. Finally, Table 3 reveals significant differences in the cognitive processing habits of the two student groups. Reflective observation measures the extent to which students learn by watching and doing. The mean difference on this subscale was significant ($M = 30.53$, $SD = 8.57$), $t(35) = 2.18$, $p < .05$, indicating that the face-to-face students are more reflective in comparison to their online counterparts. In addition, the face-to-face students report a higher degree of learning by thinking (abstract conceptualization) in comparison to the online students ($M = 34.74$, $SD = 5.67$), $t(35) = 2.11$, $p < .05$. Finally, significant differences were found on the active experimentation scale, which assesses the extent to which students learn by doing. In this case, the online students report greater use of this mode of learning ($M = 36.11$, $SD = 8.46$), $t(35) = -2.54$, $p < .05$.

Table 1: Learning Style Differences for Online versus a Face-to-Face Students

Learning Style Instrument	Face-to-Face*	Online*	t	p
Motivation Maintenance Subscales (SLSS)				
Independent	37.21 (3.55)	36.44 (4.90)	0.54	0.58
Dependent	36.79 (4.20)	36.11 (5.80)	0.40	0.68
Avoidant	21.00 (4.61)	23.06 (6.18)	- 1.15	0.25
Participant	41.84 (5.49)	38.89 (4.40)	1.18	0.24
Collaborative	40.58 (6.38)	38.50 (3.97)	1.18	0.24
Competitive	22.63 (5.98)	23.67 (7.40)	- 0.46	0.64
Task Engagement Subscales (LASSI)				
Attitude	35.00 (4.97)	35.00 (3.45)	0.00	1.00
Motivation	34.83 (3.93)	33.33 (4.83)	1.02	0.31
Time Management	30.50 (6.59)	26.83 (6.92)	1.62	0.11
Anxiety	29.89 (7.55)	31.72 (3.69)	0.92	0.36
Concentration	31.00 (4.64)	28.83 (5.75)	1.24	0.22
Information Processing	32.89 (4.78)	31.33 (4.87)	0.96	0.34
Selecting the Main Idea	21.33 (2.93)	20.89 (3.36)	0.42	0.67
Study Aids	30.17 (4.76)	23.78 (4.58)	4.10	0.00**
Self-Testing	29.39 (4.27)	26.94 (5.13)	1.55	0.12
Test Strategies	34.56 (3.81)	34.22 (4.53)	0.23	0.81
Cognitive Control Subscales (LSI)				
Concrete Experience	25.00 (6.19)	27.61 (8.12)	- 1.04	0.27
Reflective Observations	30.53 (8.57)	25.22 (5.88)	2.18	0.03**
Abstract Conceptualization	34.74 (5.67)	30.44 (6.67)	2.11	0.04**

Active Experimentation	29.16 (8.15)	36.11 (8.46)	- 2.54	0.01**

* *significant at alpha = 0.05 (2-tailed)*

Learning Style Influence on Student Success: The primary question addressed by this study was to what extent were learning styles correlated to student success when the delivery format was controlled. The data were then analyzed using bivariate correlation analysis controlling for the delivery format. As shown in Table 2, a total of five significant correlations were found. For the maintenance motivation construct, as the level of avoidance of classroom activities decreased, the course performance increased. As student participation in classroom activities increased, the course performance increased. For the task engagement construct, positive correlations were found between attitude and course performance as well as time management and course performance. These correlations suggest that as student attitude becomes more positive and the use of time management techniques increase, course performance will increase. Finally, one negative correlation was found for the cognitive controls construct. As abstract conceptualization (learning by thinking) decreased, course performance increased. This particular finding is one that warrants further investigation.

Table 2: Relationship Between Learning Style Preferences and Success in a Face-to-Face Learning Environment

Learning Style Instrument	N	Mean	SD	r	p
Motivation Maintenance Subscales (SLSS)					
Independent	19	37.21	3.55	0.15	0.51
Dependent	19	36.79	4.20	0.19	0.43
Avoidant	19	21.00	4.61	- 0.58	0.00*
Participant	19	41.84	5.49	0.58	0.00*
Collaborative	19	40.58	6.38	0.09	0.69
Competitive	19	22.63	5.98	- 0.00	0.99
Task Engagement Subscales (LASSI)					
Attitude	18	35.00	4.97	0.51	0.02*
Motivation	18	34.83	3.93	0.43	0.07
Time Management	18	30.50	6.59	0.45	0.05*
Anxiety	18	29.89	7.55	0.19	0.44
Concentration	18	31.00	4.64	0.07	0.78
Information Processing	18	32.89	4.78	0.43	0.07
Selecting the Main Idea	18	21.33	2.93	0.26	0.28
Study Aids	18	30.17	4.76	0.32	0.18
Self-Testing	18	29.39	4.27	0.24	0.32
Test Strategies	18	34.56	3.81	0.40	0.09
Cognitive Control Subscales (LSI)					
Concrete Experience	19	25.00	6.19	- 0.25	0.29
Reflective Observations	19	30.53	8.57	0.31	0.19

Abstract Conceptualization	19	34.74	5.67	- 0.56	0.01*
Active Experimentation	19	29.16	8.15	- 0.18	0.44

**significant at alpha = 0.05 (2-tailed)*

The final analysis involved a comparison of learning style preferences and success in the online learning environment. The results from this analysis of the online students' performance showed no significant relationships between learning style preferences and course performance. These results are presented in Table 3. It is interesting to note that, while there was a significant difference between the online and face-to-face students in terms of cognitive control functions, it seemed to have little impact on course performance.

Table 3: Relationship Between Learning Style Preferences and Success in an Online Learning Environment

Learning Style Instrument	N	Mean	SD	r	p
Motivation Maintenance Subscales (SLSS)					
Independent	18	36.44	4.90	- 0.29	0.23
Dependent	18	36.11	5.80	0.29	0.24
Avoidant	18	23.06	6.18	- 0.03	0.88
Participant	18	39.89	4.40	- 0.02	0.91
Collaborative	18	38.50	3.97	- 0.10	0.68
Competitive	18	23.67	7.40	- 0.35	0.15
Task Engagement Subscales (LASSI)					
Attitude	18	35.00	3.45	0.21	0.38
Motivation	18	33.33	4.83	0.27	0.26
Time Management	18	26.83	6.92	0.06	0.80
Anxiety	18	31.72	3.69	0.05	0.82
Concentration	18	28.83	5.75	- 0.11	0.66
Information Processing	18	31.33	4.87	- 0.22	0.37
Selecting the Main Idea	18	20.89	3.36	- 0.18	0.47
Study Aids	18	23.78	4.58	- 0.07	0.76
Self-Testing	18	26.94	5.13	0.16	0.52
Test Strategies	18	34.22	4.53	0.02	0.90
Cognitive Control Subscales (LSI)					
Concrete Experience	18	27.61	8.12	- 0.00	0.97
Reflective Observations	18	25.22	5.88	0.20	0.41
Abstract Conceptualization	18	30.44	6.67	0.04	0.85
Active Experimentation	18	36.11	8.46	- 0.19	0.43

**significant at alpha = 0.05 (2-tailed)*

Discussion

Based on the results of the analyses, the following conclusions are made. First, even though there were learning style differences found between the face-to-face and online students, the differences were not highly apparent when the delivery format was controlled. Looking at the results from the correlation analysis for all students, motivation was the only variable found to influence course performance.

Second, the significant results from the correlation analyses for the face-to-face students also serves to reaffirm what we know contributes to positive learning outcomes for students. As student participation increased and avoidance decreased, performance was shown to increase. Positive attitudes and increased use of time management techniques influence course performance. The surprising correlation was the negative one that existed between abstract conceptualization (learning by thinking) and course grade. It may simply be that because the instructional design class was an application, hands-on course, success is highly dependent upon participation.

Finally, the most exciting finding from this study is the fact that correlations between learning style and course performance were not found for the online students. Consequently, this finding suggests that learners can be equally as successful in the online environment regardless of learning style. Granted, it does not mean that "anything goes" but that the online course must be developed well in order for learning to occur. This is true regardless of the format or content of any course. However, at a time when criticisms are still being made against the effectiveness and quality of online instruction, these findings from this study help to negate such statements.

Implications

The findings of this study show that online learning can be as effective as face-to-face learning in many respects in spite of the fact that students have different learning style preferences. In view of these findings, several implications emerge pertaining to future online program development. First, this analysis suggests that the development and use of online programs should continue. However, it is important that quality and thoroughness of the design and delivery be the catalyst for ensuring positive online learning experiences. Second, this study suggests that that a continued understanding of adult learning theory and learning styles needs to be emphasized among faculty. This is critical if courses are going to be designed to address the various domains of learning. This is especially critical in the online environment where an element of creativity is needed to identify and design educational experiences that can be as active, collaborative, and participatory as those commonly found in the face-to-face environment. Finally, educational practitioners should be aware of their own learning style preferences. Knowing our strengths and weaknesses as educators helps us to know where we will be strong and weak in terms of instructional design and delivery. Related to the second point above, designing online instruction that keeps students motivated and active requires thinking outside the box. Unless we know the boundaries of our "boxes," we run the risk of not incorporating all learning preferences found in our students.

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